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INCENTIVE-BASED ENVIRONMENTAL REGULATION: A NEW ERA FROM AN OLD IDEA?

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EXECUTIVE SUMMARY

As the decade of the 1990's begins, increased attention has been given by political leaders to a new set of policies that recognize the potential role of market forces in achieving sustained environmental progress. Over the past two years in particular, the nature and tone of political debate has evolved rapidly, culminating with President Bush's proposal in June of 1989 of a major overhaul of the Clean Air Act, featuring a market-oriented approach to controlling acid rain and motor vehicle emissions. In addition, the Congress is considering bills that would apply economic-incentive mechanisms to problems as diverse as water pollution and hazardous waste management, and the Administration is examining incentive-based policies to address the threat of global climate change.

Although these changes in the politics of environmental policy represent a departure from long-term trends, this is hardly the first time that market-based environmental-protection ideas have been put forward. Indeed, for at least thirty years, economists have been recommending such approaches, but these suggestions have largely been ignored by policy-makers. Does the current round of incentive-based environmental proposals represent the beginning of a new era of environmental policy, albeit one based upon an old idea? Or are these proposals merely temporary blips on the policy scope? In either case, what explains the changes which have occurred? This paper addresses these questions by investigating the forces that have affected and continue to affect the introduction of market-based approaches into the political debate.

The paper begins with a brief overview of conventional and alternative approaches to environmental regulation, and a review of previous U.S. experience with incentive-based policies. We chronicle how a shift in attitudes among influential interest groups is leading to new consideration of market-based proposals at the Federal level, and we seek to explain why these changes are occurring. In this context, we identify key factors that have affected the emergence of market-based approaches throughout the world. Finally, we draw some conclusions regarding these policy mechanisms and their likely future role in addressing environmental issues.

Returning to the question with which we began, does the current round of incentive-based environmental proposals represent the beginning of a new era of environmental policy? As economists concerned about environmental policy, we are quite bullish on the use of economic-incentive approaches, but, at the same time, we are sensitive to the fact that there are very good reasons the rest of the world has been slow to embrace the use of economic-incentive approaches to environmental protection. Some of these reasons include the way economists have tried to package and sell their ideas (for example, not divorcing means from ends) and a general lack of understanding of how these instruments work in practice. But *most* resistance can be explained by the nature of the political process and the relative payoffs to elected representatives and special interest lobbyists of using command-and-control methods as opposed to market-based policies.

Thus, we believe that the use of economic-incentive policies will increase on the margin, but will likely remain limited in scope. Incentive-based approaches simply do not

provide politicians with the opportunity to affect systems in ways that give selected interest groups the protection they desire.

Despite the fact that such practical political considerations will continue to influence the design and implementation of environmental policy, there are reasons to believe that economic-incentive mechanisms will receive a warmer reception in the years to come. For the first time, big-name politicians are leading the charge. Precisely because demand is high and other proposed solutions would result in severe economic dislocation in many cases, proponents of incentive-based environmental policies should be guardedly optimistic.

INCENTIVE-BASED ENVIRONMENTAL REGULATION: A NEW ERA FROM AN OLD IDEA?

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1. INTRODUCTION

During the twenty years since Earth Day in 1970, a host of environmental laws and regulations have been enacted, and substantial gains have been made in environmental protection. But the U.S. and the world at large continue to face major environmental threats -- both ongoing problems, such as urban smog, ground water pollution, and acid rain, and newly recognized problems, including the threat of global climate change. As the decade of the 1990's begins, increased attention has been given by political leaders to a promising set of new policies that recognize the potential role of market forces in achieving sustained environmental progress.

Over the past two years, the nature and tone of political debate has evolved rapidly, culminating with President Bush's proposal in June of 1989 of a major overhaul of the Clean Air Act that featured a market-oriented approach to controlling acid rain and motor vehicle emissions.[1] Many factors contributed to this rapid evolution of policy prescriptions, including: strong interest within the Executive Office of the President; aggressive

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[1]On June 12, 1989, President Bush proposed a "tradeable permit system" for acid-rain control and vehicle emissions as part of the Administration's Clean Air Act amendments. This proposal was sent to Congress on July 21, 1989.

participation by some segments of the environmental community, notably, the Environmental Defense Fund;[2] and the release of a bipartisan study,[3] initiated and sponsored by two U.S. Senators -- Timothy Wirth (D-Colorado) and John Heinz (R-Pennsylvania) -- to find solutions to major environmental and natural resource problems. Their study dovetailed with interest within the Administration, the environmental community, and private industry, by proposing a series of measures that would enlist market forces to deter pollution and reduce waste of natural resources.[4] Partly in response, the Administrator of the U.S. Environmental Protection Agency (EPA), William K. Reilly, established an Economic Incentives Task Force to investigate the potential application of market-oriented policies throughout EPA's jurisdiction.[5]

By early 1990, discussions of potential incentive-based policies have moved beyond the writing of reports to serious consideration of actual policy mechanisms for specific problems. This is true both within the Administration and within the Congress. In addition to the President's proposal of a tradeable-permit system for acid-rain control, the Congress is considering bills that would apply economic-incentive mechanisms to problems as diverse

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[2]See: Krupp, Frederic D. "New Environmentalism Factors in Economic Needs." *Wall Street Journal*, November 20, 1986, p. 34.

[3]Stavins, Robert N., ed. *Project 88: Harnessing Market Forces to Protect Our Environment -- Initiatives for the New President*. A Public Policy Study sponsored by Senator Timothy E. Wirth, Colorado, and Senator John Heinz, Pennsylvania. Washington, D.C., December 1988.

[4]Several other studies followed the Project 88 report. See: Moore, John L., *et. al. Using Incentives for Environmental Protection: An Overview*. Congressional Research Service Report to the Congress # 89-360 ENR. Washington, D.C., June 1989; and Anderson, Robert C., *et. al. The Use of Economic Incentive Mechanisms in Environmental Management*. Draft report. Washington, D.C.: American Petroleum Institute, September 1989.

[5]The final report of the Economic Incentives Task Force, "Opportunities for Use of Incentive Policies to Promote Environmental Protection," is currently nearing completion.

as water pollution and hazardous waste management.[6] Further, the Administration is seriously examining a number of incentive-based policies to address the threat of global climate change.[7]

These changes in the politics of environmental policy represent a departure from long-term trends, but this is hardly the first time that market-based environmental-protection ideas have been put forward. Indeed, for at least thirty years, economists have been recommending such approaches to the reform of environmental policy, but these suggestions have largely been ignored by policy-makers.

Does the current round of incentive-based environmental proposals represent the beginning of a new era of environmental policy, albeit one based upon an old idea? Or are these proposals merely temporary blips on the policy scope? This paper addresses these questions by investigating the forces that have affected and continue to affect the introduction of market-based approaches into the political debate. Section 2 provides a brief overview of conventional and alternative approaches to environmental regulation. Section 3 reviews previous U.S. experience with incentive-based policies. Section 4 chronicles how a shift in attitudes among influential interest groups is leading to more serious consideration of market-based proposals at the Federal level, and section 5 seeks

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[6]For example, the Battery Recycling and Research Act of 1989, introduced by George Hochbrueckner (D-New York) in the House of Representatives and Albert Gore (D-Tennessee) in the Senate, would allow for the adoption of motor-vehicle battery deposit-refund systems at the state or local level. A more comprehensive bill, the Consumer Products Recovery Act of 1989, was introduced in the Senate by John Heinz (R-Pennsylvania) and Timothy Wirth (D-Colorado), and in the House by Esteban Torres (D-California) and Claudine Schneider (R-Rhode Island).

[7]The Administration has suggested that consideration be given to the use of international tradeable permit mechanisms for the management of global climate change. See: Bush, George. "Remarks at the Intergovernmental Panel on Climate Change." Washington, D.C.: Office of the Press Secretary, February 5, 1990. For further details, see: "Materials for the Informal Seminar on U.S. Experience with 'Comprehensive' and 'Emissions Trading' Approaches to Environmental Policy," prepared for presentation at U.S. Department of State, February 3, 1990.

to explain why these changes are occurring. Section 6 identifies the key factors that have affected the emergence of market-based approaches throughout the world. Finally, section 7 offers some concluding remarks about these policy mechanisms and their likely future role in addressing environmental issues.

2. THE REGULATOR'S TOOL CHEST

It is convenient to view the policy maker's problem in two parts: one part deals with selecting an overall goal; the other part involves selecting a means or "instrument" for achieving that goal. In practice, of course, the two tasks tend to be inextricably linked within the political process, since both the choice of the goal and the mechanism for achieving the goal have important political ramifications:[8] they can both affect the distribution of benefits and costs, and hence the attitudes of different interest groups. For example, interest-group attitudes towards a proposal to cut sulfur dioxide emissions by 10 million tons per year can vary dramatically depending on the mechanism that is selected to effect that goal. Indeed, groups that prefer a relatively high pollution target under one approach may prefer a lower target under another.

Economists and others have argued that economic criteria should play an important role in determining both the overall level of environmental quality that is selected as well as the mechanisms for achieving that goal. The argument rests on the observation that

[8]While discussion of goals typically precedes examination of alternative means for achieving goals, this is not always true. For example, the Bush administration recently endorsed the use of cost-effective methods for addressing global climate change due to the greenhouse effect. In particular, the Administration has suggested that consideration be given to the use of international tradeable permit mechanisms, an approach we describe below. At the same time, the Administration has maintained that it is essentially too soon to establish goals and standards regarding greenhouse-gas sources and sinks. See footnote 7, above, regarding the President's recommendations.

private firms, if left unregulated, will not choose a "socially efficient" level of environmental quality. This is because they are rarely, if ever, required to pay the full social costs of their actions. The economic paradigm calls for measuring the benefits of increased pollution control against the costs of control and choosing that level of pollution abatement where the additional benefits are just equal to the additional costs, because it is at that level that net social benefits of pollution-control investments will be maximized.[9]

In addition to deciding on goals and standards, decision-makers must select specific mechanisms for achieving those goals. This paper focuses exclusively on this latter task. This focus is justified by the fact that the current round of economic-incentive policy recommendations has highlighted the importance of achieving specific environmental goals in a more economical fashion. This stands in contrast with long-standing proposals to make greater use of economics in goal-setting, by identifying "efficient" policies (which maximize net-benefits). In this context, note that the merit claimed for market-based approaches is that they provide direct incentives to achieve environmental outcomes in the least expensive (most cost-effective) manner, and in a way which encourages the introduction of new and improved technologies.

Economists frequently divide instruments for achieving environmental protection into two broad categories: those that provide firms with relatively little flexibility in achieving goals -- so-called "command-and-control" approaches, and those that provide firms with greater flexibility in making environmental progress and which provide firms with incentives to look for more effective ways of making sustained environmental progress -- so-called

[9]In order to maximize the net-benefits (the difference between total benefits and total costs) of pollution control, the pollutant is controlled to the level where marginal benefits of control are equal to marginal costs.

"incentive-based" mechanisms.[10] Our approach is to focus on actual instruments that are available to policy makers within these two broad classes of instruments. To understand the strengths and weaknesses of market-based approaches, it is instructive to begin with a brief review of the dominant approach to environmental policy in most countries -- command-and-control regulation.

2.1 Conventional Command-and-Control Regulatory Mechanisms

There are two commonly used policy mechanisms for controlling environmental pollution: uniform technology-based standards and performance standards. As their name implies, technology-based standards identify particular equipment that must be used to comply with a regulation. For example, utilities may be required to install flue-gas scrubbers to control sulfur dioxide emissions or electrostatic precipitators to control particulate matter. Performance standards, on the other hand, focus on achieving a specific goal, but do not specify the means, thus providing greater flexibility than technology-based standards. A performance standard typically identifies a specific goal (for example, maximum allowable units of pollutant emitted per time period) and gives firms some latitude in meeting this measure.

Although emission standards may be effective in achieving established environmental goals and standards, they often do so at relatively high costs to society. This is particularly true in the case of uniform standards, the dominant policy mechanism for a number of environmental problems. These uniform emission standards tend to lead to outcomes where

[10]There are several instruments of importance to policy makers which do not fall conveniently within these two categories, including monitoring and enforcement techniques, use of the courts, and the use of information. In designing a system, including one based on economic incentives, these mechanisms should not be overlooked either as complements or substitutes in system design.

many firms use unduly expensive means of controlling pollution. The reason is simple: the costs of controlling emissions of pollutants vary greatly among (and within) firms. Indeed, the cost of controlling a unit of a given pollutant may vary by a factor of 100 or more among sources, depending upon the age and location of plants and the technologies at their disposal. Any given aggregate pollution level can be met at minimum aggregate control cost if and only if firms control at the same *marginal cost*, as opposed to the same emission (or control) *level*.

One approach to achieving such a cost-effective allocation of the pollution-control burden among sources would be for the government (or some other centralized authority) to insure by some means that all sources controlled at the same marginal control cost. But such an approach would require the government to have detailed information about the cost functions of individual firms and sources, information that it clearly lacks and that it could obtain only at great cost, if at all.

Are there ways that the cost-minimizing allocation could be achieved without this costly information requirement? The answer is that policy mechanisms based upon economic-incentive systems have the characteristic of ensuring that firms "automatically"[11] undertake pollution-control efforts in precisely the manner and degree which will result in the cost-effective allocation of the overall control burden. Moreover, economic-incentive approaches generally provide firms with incentives to find cleaner and less expensive production technologies.

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[11]It is no coincidence that one is reminded of Adam Smith's characterization of individual market decisions operating in the collective interests of society, as if guided by an "invisible hand." See: Smith, Adam. *The Wealth of Nations*. London: J. M. Dent and Sons, 1977 (1776).

Most such approaches can be viewed as falling within one (or more) of five major categories: pollution charges, marketable permits, deposit-refund systems, market-barrier reductions, and government subsidy elimination.

2.2 Pollution Charges

Charge systems impose a fee or tax on pollution (*not* simply on pollution-generating activities).[12] Firms control to different degrees because they face different control costs, but the beauty of the fee system is that firms face the same incentive to control at the margin. A firm will control up to the point at which the marginal cost of control just equals the fee. The result is that the total costs of pollution control are minimized, as compared with other allocations of the pollution-control burden across firms. Charges, along with other market-based mechanisms, provide ongoing incentives for firms to develop and adopt newer, better pollution-control technologies.

Examples of water pollution charges are found in several European nations, including France, the Netherlands, and West Germany.[13] A frequently discussed potential new application is a carbon tax to help control global warming.[14]

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[12]Pigou is generally credited with developing the idea of a corrective tax to discourage activities which generate externalities such as environmental pollution. See: Pigou, A. C. *The Economics of Welfare*, 4th edition. London: Macmillan, 1932.

[13]Opschoor, J. B. and Hans B. Vos. *Economic Instruments for Environmental Protection.* Paris: Organization for Economic Cooperation and Development, 1989.

[14]This idea, which has come to be considered by policy-makers only recently, dates back at least to: Nordhaus, William D. "How Fast Should We Graze the Global Commons?" *American Economic Review* 72(1982):242-246.

2.3 Marketable Permit Systems

One problem with emission charge systems is that governments do not know in advance what level of clean-up will result from any given charge. Marketable permit systems eliminate this particular problem. Marketable or tradeable permits can achieve the same cost-minimizing allocation of the pollution-control burden as a charge scheme, but do so in ways that avoid the aforementioned problem of uncertain firm responses.[15] Under a tradeable-permit system, the allowable overall level of pollution is established and then allotted in the form of permits among firms. Firms that keep emission levels down below the allotted level may sell or lease their surplus permits to other firms or use them to offset excess emissions in other parts of their own facilities.

As with a charge system, the marginal cost of control is identical across firms, and thus the total cost of control is minimized (for any given level of total pollution control). In the case of local air-pollution control, for example, this approach could be substantially more efficient than current regulatory methods, both because its inherent flexibility takes advantage of differences in control costs which range from $500/ton of emissions (fuel-volatility sources) to $39,000/ton (methanol-conversion sources), and because it allows individual firms to decide where and how to make desired reductions.[16]

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[15]See: Hahn, Robert and Roger Noll. "Designing a Market for Tradeable Permits." *Reform of Environmental Regulation*, ed. Wesley Magat, pp. 119-146. Cambridge: Ballinger, 1982. Much of the literature on tradeable permits may actually be traced to Coase's treatment of negotiated solutions to externality problems. See: Coase, Ronald H. "The Problem of Social Cost." *Journal of Law and Economics* 3(1960):1-44

[16]Differences in source location and seasonal factors mean that not all emissions reductions are of equal value in terms of improving air quality, a problem which also applies to command-and-control approaches. While it is, of course, theoretically desirable to take account of such differences, it must be recognized that in some cases it may not be practical to do so. See: Tietenberg, Tom H. "Transferable Discharge Permits and the Control of Stationary Source Air Pollution: A Survey and Synthesis." *Land Economics* 56(1980):391-416.

Both taxes and permit systems can be used to improve environmental quality. Permit systems, for example, can limit the overall amount of emissions, and thus encourage firms to clean up. Where overall emission targets are viewed as too strict, the government may choose to increase the supply of permits, though this would rarely happen in practice.

The primary application of such mechanisms has been in the United States, both under the Environmental Protection Agency's (EPA) Emissions Trading Program and the nationwide lead-phasedown (which allowed fuel refiners to "bank" and "trade").[17] Congress is considering a marketable permit system for acid-rain control and controlling vehicle emissions. Other potential areas of application include: local air pollution,[18] point and non-point source water pollution, chlorofluorocarbon (CFC) reduction,[19] and control of global warming through international trading in greenhouse gas permits and offsets.[20]

2.4 Deposit-Refund Systems

Under this approach, surcharges are paid when potentially polluting products are purchased. When the product's consumers/users return the product to an approved center (for recycling or proper disposal), their deposit is refunded. This approach has already been used successfully in a number of states through so-called "bottle bills" to reduce littering with

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[17]See: Hahn, Robert W. and Gordon L. Hester. "Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program." *Yale Journal of Regulation* 6(1989):109-153; and Hahn, Robert W. and Gordon L. Hester. "Marketable Permits: Lessons for Theory and Practice." *Ecology Law Quarterly*, 16(1989): 361-406.

[18]Hahn, Robert W. "Innovative Approaches for Revising the Clean Air Act." *Natural Resources Journal* 28(1988):171-188.

[19]Although the term CFC is often used to indicate the class of potential ozone depleting (POD) substances, it is misleading. Only three of the seven most important POD's are CFC's, and several of the proposed POD substitutes are themselves CFC's.

[20]See footnote 7, above.

beverage containers *and* to reduce the flow of solid waste to costly landfills.[21] An advantage of deposit-refund systems is that they eliminate the incentive for illegal "midnight dumping" which exists under a simple waste-end tax or fee.

Deposit-refund systems can be used for containerizable hazardous waste and for certain forms of solid waste.[22] Lead-acid batteries, used motor vehicle oil, and vehicle tires are obvious candidates. Denmark has such a plan for mercury and cadmium batteries, and Norway and Sweden have successful deposit-refund systems on car hulks.[23] There are proposals in the Congress for applying the deposit-refund concept to new problem areas.[24]

2.5 Removing Market Barriers

In some cases, substantial gains can be made in environmental protection simply by removing existing, government-mandated barriers to market activity. For example, measures that facilitate the voluntary exchange of water rights can promote more efficient allocation and use of scarce water supplies, while curbing the need for expensive and environmentally disruptive new water supply projects.[25] Negotiations are now underway for a major market-oriented water exchange in southern California. Other applications of the general

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[21]Bohm, Peter. *Deposit-Refund Systems: Theory and Applications to Environmental, Conservation, and Consumer Policy.* Washington, D.C.: Resources for the Future, 1981.

[22]Hahn, Robert W. "An Evaluation of Options for Reducing Hazardous Waste." *Harvard Environmental Law Review* 12(1986), 201-230; and Russell, Clifford S. "Economic Incentives in the Management of Hazardous Wastes." *Columbia Journal of Environmental Law* 13(1988):257-274.

[23]Opschoor, J. B. and Hans B. Vos. *Economic Instruments for Environmental Protection.* Paris: Organization for Economic Cooperation and Development, 1989.

[24]See footnote 6, above.

[25]Wahl, Richard W. *Markets for Federal Water: Subsidies, Property Rights, and the Bureau of Reclamation.* Washington, D.C.: Resources for the Future, 1989.

concept include competitive bidding for solid-waste management[26] and comprehensive least-cost bidding at electrical utilities,[27] a measure that would promote economically rational energy generation and consumption.

2.6 Eliminating Government Subsidies

In theory, subsidies can provide important economic incentives to address environmental problems. Indeed, subsidies are the mirror image of various kinds of taxes.[28] In practice, however, many subsidies promote inefficient and environmentally unsound development. A major example is provided by the existence of "below-cost timber sales" -- where the Forest Service does not recover the full cost of making timber available.[29] The result of this set of subsides has been excessive timber cutting, thereby

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[26]If communities are to adopt efficient solutions to their solid waste management problems, all methods, including surface disposal, incineration, and recycling, must be considered on an equal basis. The bidding process should be opened to all techniques, by specifying outputs and results rather than specific techniques.

[27]Since an electrical utility's capacity problem fundamentally is one of expected demand exceeding expected supply, there is no reason to limit possible solutions to those that augment supply; means of curtailing demand can also be effective. The more cost-effective approach is to utilize whatever solution is least expensive, be it on the supply side or the demand side. See: Cicchetti, Charles and William Hogan. *Including Unbundled Demand Side Options in Electric Utility Bidding Programs.* Energy and Environmental Policy Center Discussion Paper E-88-07. Cambridge: Harvard University, August 1988. What is needed before utilities will have incentives to entertain such comprehensive least-cost bidding is permission from state regulatory agencies for utilities to write demand-side investments (such as wrapping customers' hot-water heaters) into their rate bases. This would be authorized by Senator Wirth's proposed National Environmental Policy Act of 1990, which would amend the Public Utility Regulatory Policy Act (PURPA) of 1978.

[28]Several authors have noted that subsidies and fees provide different incentives for entry into a business, and thus can have a different effect than taxes on the long-run equilibrium of an industry. See, for example, Page, Talbot. "Failure of Bribes and Standards for Air Pollution Abatement." *Natural Resources Journal* 13(1973): 677-704.

[29]Bowes, Michael D. and John V. Krutilla. *Multiple-Use Management: The Economics of Public Forestlands.* Washington, D.C.: Resources for the Future, 1989.

leading to substantial loss of habitat and damage to watershed values. Gradual removal of these subsidies would foster environmental protection and increase net Federal revenues.[30]

Other examples of subsidies that are both economically inefficient and environmentally disruptive include those associated with U.S. Army Corps of Engineers flood-control projects,[31] U.S. Bureau of Reclamation projects, and agricultural price supports.[32]

2.7 Incentive-Based versus Conventional Policy Mechanisms

There are a wide array of economic instruments that can be used to improve environmental quality while lowering costs of compliance, but these approaches have taken a back seat to a system of command-and-control regulation and subsidies. While environmental progress has been made using the traditional approaches, there is increasing recognition that the current system may not be able to offer the kind of improvements that the public is now demanding.

At a time of concern about international competitiveness, incentive-based approaches can provide huge savings and increases in productivity. For example, a market-based approach to acid-rain reduction could save up to $3 billion per year, compared with the cost of a dictated technological solution.[33] And, incentive-based approaches need not be any

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[30]See: Stavins, Robert N. "Alternative Renewable Resource Strategies: A Simulation of Optimal Use." *Journal of Environmental Economics and Management* 18(1990), in press.

[31]Stavins, Robert N. and Adam B. Jaffe. "Unintended Impacts of Public Investments on Private Decisions: The Depletion of Forested Wetlands." *American Economic Review*, 80(1990), in press.

[32]See: Phipps, T. "The Farm Bill, Resources, and Environmental Quality." *Resources*, Winter 1986.

[33]ICF Resources, Inc. *Economic Analysis of Title V (Acid Rain Provisions) of the Administration's Proposed Clean Air Act Amendments (H.R. 3030/S. 1490)*. Prepared for the U.S. Environmental Protection Agency. Washington, D.C., September 1989. More conservative estimates indicate that the

more expensive for the government to administer than conventional, regulatory methods. In fact, funds from tradeable-permit auctions could be used to help finance an expanded EPA budget.[34] Also, such systems provide incentives for one firm to monitor the activities of other pollutant-emitting firms -- another manifestation of the discipline of a competitive market. This is not to suggest, however, that environmental protection can be achieved without significant government expenditures, since no program of controls can be effective without monitoring and enforcement.

In addition to allowing greater levels of environmental protection for any given *aggregate* cost of control, market-oriented policies can provide powerful incentives for the development of new pollution-control technologies by the private sector. Because investments in pollution control lead to tangible, positive effects on profits under incentive-based systems, these policies can provide significant inducements for firms to adopt new pollution-control technologies. In turn, incentives are created for those same firms or others to carry out research and development of cheaper and better pollution-abatement techniques.[35]

Administration's proposed marketable permit program for acid-rain control would save between $13 and $16 billion by the year 2010, compared with a conventional approach. See: Hahn, Robert W. "Designing Markets in Tradable Allowances for Reducing Acid Deposition." Draft manuscript. Washington, D.C., December 1989.

[34]For further discussion of such possibilities, see: Ackerman, Bruce A. and Richard B. Stewart. "Reforming Environmental Law: The Democratic Case for Market Incentives." *Columbia Journal of Environmental Law* 13(1988):171-199.

[35]In general, the relative superiority (in terms of inducing technological innovation and diffusion) of incentive-based approaches, compared with conventional command-and-control approaches, is clear. See: Milliman, Scott R. and Raymond Prince. "Firm Incentives to Promote Technological Change in Pollution Control." *Journal of Environmental Economics and Management* 17(1989): 247-265. Under certain circumstances, however, emission credit trading may reduce firms' incentives to adopt new technology. On this, see: Malueg, David A. "Emission Credit Trading and the Incentive to Adopt New Pollution Abatement Technology." *Journal of Environmental Economics and Management* 16 (1989):52-57.

As we discuss below, a potential difficulty with incentive-based approaches is that such policies will require regulators to change the way they think about their jobs.[36] No longer will regulators be in the business of evaluating different pollution control technologies and strategies. Firms will do that for themselves, driven by the cost of continued pollution. Regulators may at first feel that they have less control over the system, because actual pollution-control decisions will be made by polluters, not by the government. But, this is the whole point of decentralized market approaches -- these systems will be effective only if decision-making is decentralized.

Incentive-based approaches have an added benefit: they can make the environmental debate more understandable to the general public. Because they do not dictate a particular technology, these approaches can focus attention directly on what our environmental goals should be, rather than on difficult technical questions concerning technological alternatives for reaching those goals.[37]

Market-oriented policies, however, will not fit every problem. On the one hand, incentive-based approaches seem virtually tailor-made for problems such as acid rain, where concern focuses on aggregate pollution levels (within an airshed), since economic-incentive mechanisms allocate the pollution burden across firms to minimize total expenditures for any given level of aggregate control. On the other hand, with environmental problems which display local *and* threshold effects, concern focuses on the level of pollution emitted

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[36]Stewart, Richard B. "Controlling Environmental Risks Through Economic Incentives." *Columbia Journal of Environmental Law* 13(1988):153-169.

[37]See footnote 34, above.

by individual sources. In this case, a conventional, command-and-control approach may represent the preferred policy.[38]

The best set of policies may well involve a mix of market and more conventional regulatory processes. To design and implement improved policies, it will be necessary to adapt, not abandon, present programs and build step-by-step on U.S. and other industrialized nations' market-based initiatives.

3. PREVIOUS U.S. EXPERIENCE WITH INCENTIVE-BASED ENVIRONMENTAL POLICIES

Market-based approaches for environmental protection have been implemented on a limited scale in the U.S. and several European nations. To provide a flavor of the potential and limitations of these approaches, four of the U.S. experiences are described here in more detail.

3.1 EPA's Emissions Trading Program

In 1974, EPA began to experiment with "emissions trading" as part of its program for the improvement of local air quality. Firms that reduce emissions below the level required by law have been allowed to receive "credits" usable against higher emissions elsewhere. Under programs of "netting" and "bubbles," firms have been permitted to "trade" emissions

[38]Even in the former case, command-and-control may be attractive if it achieves a similar outcome to a market-based approach and there are high transactions costs associated with using multiple markets. Moreover, command-and-control could, in principle, distribute the same emissions loading in a way that increases efficiency compared to a single market, when net economic benefits are taken into account. See: Oates, Wallace E., Paul A. Portney, and Albert M. McGartland. "The Net Benefits of Incentive Based Regulation: A Case Study of Environmental Standard Setting." *American Economic Review* 79(1989): 1233-1242.

reductions among sources within the firm, so long as total, combined emissions comply with an aggregate limit.[39]

Firms have also traded emissions credits. Under the "offset" program, begun in 1976, firms which wish to establish new sources in areas which are not in compliance with ambient standards have been required to offset their new emissions by reducing existing emissions by a greater amount. This can be done with their own sources or through agreements with other firms. Finally, under the "banking" program, firms may store earned emission credits for future use, to allow either for internal expansion or for sale of credits to other firms.

These programs were codified in EPA's Final Policy Statement on Emissions Trading in 1986, but their use to date has not been extensive.[40] States are not required to use them, and uncertainties about the future course of the programs have made firms reluctant to participate.[41] Nevertheless, companies such as Armco, Du Pont, USX, and 3M have traded emissions credits, and a market for transfers has arisen.[42] Even this limited degree of participation in EPA's trading programs is estimated to have saved between $5 and $12 billion over the life of the program.[43]

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[39]For an assessment of EPA's experiences with incentive-based policies, see: Hahn, Robert W. "Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders." *Journal of Economic Perspectives* 3(1989):95-114. An evaluation of EPA's Emissions Trading Program can be found in: Tietenberg, Tom. *Emissions Trading: An Exercise in Reforming Pollution Policy.* Washington: Resources for the Future, 1985.

[40]Dudek, Daniel J., and John Palmisano. "Emissions Trading: Why is This Thoroughbred Hobbled?" *Columbia Journal of Environmental Law* 13(1988):217-256.

[41]Liroff, Richard A. *Reforming Air Pollution Regulations: The Toil and Trouble of EPA's Bubble.* Washington, D.C.: The Conservation Foundation, 1986.

[42]See: Main, Jeremy. "Here Comes the Big New Cleanup." *Fortune*, November 21, 1988, pp. 102-118; and Lockhead, Carolyn. "Credit Bartering in the Market for Air Pollution." *Insight*, July 3, 1989, pp. 15-17.

[43]See footnote 17, above.

3.2 Lead Trading

EPA's program allowing lead trading stands in stark contrast to the emissions trading program for air pollution. It comes much closer to the economist's ideal of a freely functioning market. The purpose of the lead trading program was to allow gasoline refiners greater flexibility during a period when the amount of lead in gasoline was being significantly reduced.

Inter-refinery trading of lead credits was authorized in 1982. To create lead credits, refiners had to produce gasoline that had a lower lead content than that required by the standard. Banking of lead credits was initiated in 1985, and was used extensively by firms. Unlike many other programs, the lead trading program was scheduled to have a fixed life from the outset. The trading program was terminated at the end of 1987, when the lead phasedown had been accomplished.

Although the benefits of the trading program are difficult to measure directly, it is clear that the program was successful in meeting its environmental targets.[44] The level of trading between firms was high, far surpassing levels observed in other environmental markets. In 1985, over half of the refineries participated in trading with other firms. EPA estimated that savings resulting from the lead trading program were approximately $200 million annually.[45]

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[44]For a description of early implementation difficulties, see: U.S. General Accounting Office. *Vehicle Emissions: EPA Program to Assist Leaded-Gasoline Producers Needs Prompt Improvement.* GAO/RCED-86-182. Washington, D.C., August 1986.

[45]U.S. Environmental Protection Agency. "Costs and Benefits of Reducing Lead in Gasoline, Final Regulatory Impact Analysis." Washington, D.C.: Office of Policy Analysis, February 1985.

3.3 Tradeable Permits for Water Pollution Control

Nonpoint sources, particularly from agriculture and urban runoff, now constitute the major American water pollution problem. The experience of Dillon Reservoir, the major source of water for the city of Denver, Colorado, provides an example of a trading approach for nonpoint source water pollution. In past years, nitrogen and phosphorus loading was turning the reservoir eutrophic, despite the fact that point sources from surrounding communities were controlled to best-available-technology standards. In order to preserve and protect water quality in the face of rapid population growth, a "point/nonpoint source control optimization" program was developed to cut phosphorus flows mainly from nonpoint urban and agricultural sources.

The point/nonpoint source trading plan, initiated in 1984, allows for publicly owned sewage treatment works to finance the control of nonpoint sources in lieu of upgrading their own treated effluent to drinking-water standards. While no trading has yet occurred, EPA estimates that the plan could save over $1 million per year, due to large differences in the marginal costs of control between nonpoint sources and the sewage treatment facilities.

3.4 Voluntary Water Exchanges

One effective approach to water supply problems is to allow the voluntary exchange of water rights in order to increase efficiency -- most notably by creating economic incentives for water conservation. In the Imperial Irrigation District (IID) of California, farmers pay as little as $10 for water to irrigate an acre of cotton, while just a few hundred miles away in Los Angeles, local authorities of the Metropolitan Water District (MWD) pay up to $200 for the same quantity of water. A free market in water rights, allowing voluntary exchanges, would make both parties better off: farmers would have a financial stake in

conserving water, urban needs would be met without shrinking agriculture and without building new dams and reservoirs, and environmental protection would gain.

In March of 1983, the Environmental Defense Fund (EDF) published a proposal calling for MWD to finance the modernization of IID's water system in exchange for use of conserved water.[46] In November, 1988, after five years of negotiation, the two water giants reached agreement on a $230 million water conservation and transfer arrangement[47] that closely parallels EDF's original proposal. This southern California water swap may be the harbinger of more enlightened western water policy, since it demonstrates that such trades can be executed on a significant scale. There have been reports of greatly increased interest in water marketing in Colorado, New Mexico, Arizona, Nevada, Utah, and California.[48]

3.5 Other Examples

Other incentive-based environmental-protection strategies include EPA's tradeable permit system for implementing the Montreal Protocol's stratospheric ozone-depletion restrictions, and some "experimental" use of comprehensive least-cost bidding by electrical

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[46]Stavins, Robert N. *Trading Conservation Investments for Water*. Berkeley, California: Environmental Defense Fund, 1983.

[47]Morris, Willy. "IID Approves State's First Water Swap with MWD." *Imperial Valley Press*, November 9, 1988.

[48]Atchison, Sandra D. "Where Water is Money in the Bank." *Business Week*, August 15, 1988, p. 50.

utilities.[49] Also, several European nations have had significant experiences with the use of economic-incentive mechanisms.[50]

4. WINDS OF CHANGE FROM WASHINGTON

For the first time, economic incentive approaches for enhancing environmental quality have moved to center stage in Washington. Some people have even described these approaches as constituting an emerging consensus position or as becoming a new conventional wisdom. While such claims are premature, it is certainly true that we have come a very long way from the time when economic-incentive approaches were characterized as "licenses to pollute" or dismissed as completely impractical.[51]

4.1 A Hearty Endorsement from the Bush Administration

The Bush Administration has, overall, been enthusiastic about incentive-based strategies for environmental protection, and has proceeded to take these ideas from general concepts to specific legislative proposals. Also, EPA Administrator William K. Reilly has established an Incentives Task Force within his agency to identify new areas where market

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[49]Maine held one such auction in 1989; Massachusetts and New York have announced their intentions to hold similar auctions.

[50]See: Opschoor, J. B. and Hans B. Vos. *Economic Instruments for Environmental Protection.* Paris: Organization for Economic Cooperation and Development, 1989; and OECD Environment Committee on Natural Resource Management. *Renewable Natural Resources: Economic Incentives for Improved Management.* Paris: Organization for Economic Cooperation and Development, 1989. A brief overview is provided by: Spellman, James David. "Environmental Needs Challenge the Global Marketplace." *Europe Magazine*, September 1989, pp. 18-20.

[51]President Lyndon Johnson's proposal for effluent fees was not given serious consideration, nor were President Richard Nixon's recommendations for a tax on lead in gasoline and a sulfur-dioxide emission fee. See: Alm, Alvin L. "The Postregulatory Environmental Protection Regime." *Environmental Science and Technology* 23(1989):1338-1339.

based approaches can be utilized. There is strong resistance, however, from some parts of the EPA bureaucracy.

Some of this resistance has been institutional in nature -- policy staff versus program staff;[52] some has been professional -- economists versus lawyers.[53] Some resistance has also been due to bureaucrats whose human capital would essentially be dissipated if the rules of the game were changed. For example, with incentive-based policies in place to control acid rain, the services of some engineers within EPA might no longer be required to evaluate technologies for disparate sources of emissions across the country. Instead, the decision of what technologies to use for pollution control would be left up to individual firms. At the same time, however, there will be no dearth of employment opportunities for EPA personnel if incentive-based approaches are broadly adopted. Finally, it should be recognized that some of the concern within the EPA bureaucracy may simply be due to skepticism related to the fact that these approaches have not yet been applied on a large scale. There is a difference, of course, between healthy skepticism and resolute resistance to change.

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[52]In the past, the air program office was instrumental in retarding the evolution of emissions trading, but this situation seems to have reversed itself with the introduction of the President's market-based acid-rain initiative. Part of the original resistance may have been due to a "not-invented-here" syndrome, since the initial impetus for the emissions trading program came primarily from within the policy office. Later, the air office came to promote the limited use of markets to reduce sulfur dioxide emissions that cause acid rain. At that point, the air office had a vested interest in promoting the idea.

[53]It should also be recognized that a number of legal scholars and practicing attorneys have been among the most eloquent spokespersons for economic-incentive strategies for the past two decades. For example, see: Stewart, Richard B. "Controlling Environmental Risks Through Economic Incentives." *Columbia Journal of Environmental Law* 13(1988):153-169; Krier, James E. "Marketlike Approaches: Their Past, Present, and Probable Future." LeRoy Graymer and Frederick Thompson, eds., *Reforming Social Regulation*, pp. 151-158. Beverly Hills: Sage Publications, 1982; and Levin, Michael H. "New Directions in Environmental Policy: The Case for Environmental Incentives." *Proceedings of Annual Midwinter Meeting, American Bar Association, Section of Natural Resource Law*. Keystone, Colorado, March 18-20, 1988.

Surely the most important indication of the overall acceptance of these ideas by the Administration has been the President's endorsement in the form of the Administration's clean air bill, which, as mentioned above, included within it provision for a tradeable-permit approach for the control of acid rain and emissions from motor vehicles.[54] More recently, the President has endorsed the use of market mechanisms to address concerns about global warming.[55]

4.2 Increasing Curiosity and Interest in Congress

Equally or more important than the Administration's position if new legislative authority is necessary is, of course, the Congress. Here, there is interest and new openness to debate. Significantly, the center has shifted. For example, Congressman Henry Waxman, a leading figure on environmental issues in the House of Representatives, described his own clean air proposals during the current session of Congress as including the use of economic-incentive mechanisms. More to the point, in early April, 1990, the Senate passed its version of the Clean Air Bill (S. 1630) with a tradeable-permit system patterned after the one proposed in the Administration's bill. The House of Representatives did likewise (H.R. 3030) in late May. Finally, for a diverse set of problems, new incentive-based legislative initiatives are being developed.[56]

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[54]For an assessment of political factors affecting the evolution of the Administration's Clean Air bill, see Hahn, Robert. "The Politics and Religion of Clean Air." *Regulation*, Winter 1990, pp. 21-30.

[55]The President did not suggest that a specific policy was needed to limit greenhouse gas emissions at this time, however. See, for example: Weisskopf, Michael. "Bush Pledges Research on Global Warming." *Washington Post*. February 6, 1990, p. A1.

[56]See footnotes 6 and 27, above.

4.3 Environmental Advocacy Groups

Closely related to the prognosis of Congressional opportunities are the positions of the major environmental advocacy organizations. Their cooperation, or at least their tacit support, will be essential if there is to be a new era of improved environmental policy. There is now reason to believe that for the first time these groups may indeed support market-based reforms. The Environmental Defense Fund has become an enthusiastic proponent of these ideas -- it was a major participant in the Project 88 effort and worked closely with White House staff to develop the Administration's Clean Air Act proposal. A number of other prominent environmental groups, including the National Audubon Society, the Sierra Club, the Wilderness Society,[57] and the National Resources Defense Council[58] have now come to support at least selective use of economic-incentive mechanisms.

4.4 Private Industry

The business community, not surprisingly, has long endorsed cost-effective, market-oriented approaches to environmental protection. But now that these ideas are no longer simply the province of academic discourse or business round tables, a somewhat surprising trend has emerged: major resistance from industry lobbyists (in contrast with the largely positive reception from senior management at corporate headquarters[59]). Part of the

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[57]For comments by leaders of these groups, see: Stavins, Robert N., ed. *Summary of Proceedings of Harvard University's John F. Kennedy School of Government/Project 88 Conference.* Energy and Environmental Policy Center Discussion Paper M-89-02, Cambridge, Massachusetts, August 1989.

[58]The endorsement of the Natural Resources Defense Council -- a leader on clean air issues -- for a tradeable-permit system for acid-rain control is particularly important. See: Wald, Matthew L. "Searching for Incentives to Entice Polluters." *New York Times*, October 8, 1989.

[59]For example, General Motors has endorsed the adoption of a broad-based carbon fee to limit emissions of greenhouse gases. See: Eads, George C. "Comments of George C. Eads" at United Nations Economic Commission for Europe/U.S. Environmental Protection Agency Workshop on the Economics of Sustainable

explanation is associated with a principal-agent phenomenon; private-sector lobbyists, like government bureaucrats, wish to prevent the dissipation of their human capital. Hence, these individuals feel wedded to the status quo. Having learned to fine-tune the regulatory system, they are understandably reticent to allow any major changes in the rules of the game.

It should also be noted that the private sector recognizes that certain incentive-based instruments can actually cost them more than command-and-control approaches. Although market-based approaches provide any given level of environmental protection at minimum cost for society as a whole, some instruments -- including some that are command-and-control and some that are incentive-based -- involve substantial financial transfers among various sectors (each such transfer is a "wash" in terms of contributing to overall societal costs). In particular, an emission fee or tax is much more costly to the polluting sector than is an equivalent tradeable permit mechanism,[60] because the tax itself is a transfer from that segment of private industry to the government.

Individual businesses are concerned primarily with the immediate impact of proposed legislation on profits. Industry, while acknowledging deficiencies with the current approach to regulation, has learned to live with it. Additionally, private industry has voiced concerns regarding whether the actual implementation of specific market-based approaches will, in fact, lead to greater flexibility.

Development, Washington, D.C., January 25, 1990, p. 7.

[60]"Equivalent" in the sense that a specific tax and a specific tradeable permit system lead to the same amount of environmental protection. The lower cost of the trading scheme assumes that the permits are distributed free of charge. If the permits are auctioned or in some other way sold to recipients, there is a consequent financial transfer from the private sector to the government, as in the case of taxes.

Despite such concerns from various sectors, the fact remains that there has been widespread support for a move to economic-incentive approaches for protecting the environment.

5. WHAT EXPLAINS THE OBSERVED CHANGES?

The question which remains is why there is much greater support than ever before among politicians and other policy players in Washington for incentive-based policies. Nearly ten years ago, Steven Kelman investigated the positions held by Congressional members and staff regarding economic-incentive approaches to environmental protection.[61] He found that Democrats generally did not favor these approaches, but he also found that they did not really understand these ideas. When Kelman spoke with Republicans, he found that they *did* support incentive-based approaches, although they did not understand them either!

What would we find if we were to redo Kelman's survey today? As indicated above, it appears we would find more support (among both Democrats and Republicans), but would we find more understanding? The likely answer is not enough of an increase in understanding to explain the magnitude of change in the degree of support. What else has mattered?

First, some political liberals and environmentalists (two separate, although partially overlapping populations) have come to question how much more can be accomplished with

[61]Kelman focused on emission charges, as opposed to marketable permits, because the former were more frequently discussed at the time. See: Kelman, Steven. *What Price Incentives? Economists and the Environment*. Boston: Auburn House, 1981.

conventional, command-and-control regulations. The costs of environmental control continue to increase (as we move further up the marginal-cost-of-control curve). Costs of compliance with environmental regulations in the U.S. have reached about $90 billion per year, an increase of nearly 40% since 1984.[62] As a result, many in the policy community have begun to consider seriously the cost-effectiveness of alternative means of achieving national environmental goals.

Also, there is the new economic climate the country faces, dramatically different from that of twenty years ago. Today there is great concern in the U.S. about both domestic productivity and international competitiveness. Furthermore, the reality of chronic, large Federal budgetary deficits means that there is less and less support for simply spending more government resources on existing policy approaches. In addition, the nature of the environmental problems has changed. There are new ones, like acid rain, that have neither a bureaucratic nor industrial constituency tied to the current policy approach, since there is *no* current policy approach.

Political realities also have been extremely important. "Fiscally responsible environmental protection" does have the sound of the quintessential moderate Republican issue, and this is, after all, a moderate Republican administration. There is little doubt that the Bush Administration sees the opportunity to woo many moderate voters by taking an aggressive, but cost-effective, approach to addressing environmental concerns. Moreover, Democrats and Republicans alike have been moving toward a more favorable view of market-oriented approaches to economic and social regulation, as evidenced by experiences

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[62]In 1984, total U.S. expenditures on pollution control amounted to about $65 billion -- 63% by businesses, 21% by all levels of government, and 16% by consumers. Total pollution control expenditures were about 1.8% of GNP. See: Farber, Kit D. and Gary L. Rutledge. "Pollution Abatement and Control Expenditures." *Survey of Current Business* 66(1986):100-103.

with deregulation of the airline and trucking industries, the introduction of increased competition in telecommunications, and some limited experimentation with markets for controlling pollution.

Contemporary recommendations for environmental policy reform, such as the proposed marketable-permit system for acid-rain control, do not call for abandoning the environmental policies that have been built up over the past twenty years. Moreover, as noted above, incentive mechanisms are not appropriate for all environmental problems, although substantial gains can likely be made by *selectively* supplementing conventional, command-and-control policies with market-based strategies, where the latter can be effective and practical. The current round of proposals, then, is not really a call for deregulation, but for new and improved regulation.

Finally, there is the symbolic importance of separating out goals and standards from the means of achieving those goals and standards. Implicit within the current round of incentive-based recommendations is the notion of using the conventional deliberative process to establish goals and standards, while achieving those standards by the least-cost means. In other words, the current round of proposals do not require the use of benefit-cost analysis as an exclusive criterion for selecting environmental goals. There is no call for evaluating environmental amenities in purely economic terms. This is important, because it is this idea, placing a dollar value on environmental amenities, which has traditionally been most vigorously opposed by virtually all environmental organizations and by many others in the policy community.[63]

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[63]A number of our observations can be summarized by saying that there are "right times" for certain policy goals to be considered favorably -- periods of high income lend themselves to moves to stricter environmental goals, due to positive income elasticity of demand for environmental amenities and to loosening at such times of budgetary constraints. Likewise, there are "right times" for certain policy mechanisms to be given serious

6. IDENTIFYING THE CONDITIONS FOR CHANGE

Any decision by the body politic to use economic incentive approaches will depend on a variety of factors. In this section, we offer a relatively parsimonious account of factors which are critical to actual decisions to use economic instruments to address environmental problems. We argue that the use of economic instruments will tend to increase with increases in:

(1) the political demand for environmental quality;

(2) the incremental cost of providing additional improvements in environmental quality;

(3) these policies' potential to improve environmental quality and increase industry profits (compared with likely alternative policies);

(4) influence and employment opportunities for bureaucrats implementing the programs;

(5) the absence of concentrated "losers;"

(6) understanding of how economic instruments work in theory and practice; and

(7) the level of confidence in actual applications of economic instruments.

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attention -- periods of concern regarding domestic productivity and international competitiveness favor consideration of cost-effective policies. It should also be recognized that there exists another dimension of some practical importance -- the "right person at the right time." Without making any assertions regarding either necessary or sufficient conditions, it seems clear that the coincidence of specific individuals in key positions at the White House, EPA, the Congress, and environmental organizations contributed significantly to the observed policy outcomes of the past two years. Were one to analyze quantitatively the factors contributing to these observed policy outcomes it would be necessary to allow for the role played by such individuals. To do otherwise would be analogous to omitting the variable, "management," in production-function analysis. In both cases, the unobserved or at least immeasurable nature of the variable may result in treating it as a discrete (dummy) variable.

The first two factors relate to the overall provision of environmental quality. The third, fourth, and fifth factors help nurture the support of key special interest groups. Finally, the sixth and seventh factors affect both public perceptions as well as the attitudes of key interest groups towards economic instruments.

6.1 Political Demand for Environmental Quality and the Cost of Pollution Control

As the political demand for environmental quality increases, politicians will be more willing to devote greater resources to environmental concerns. As noted earlier, there is considerable evidence that environmental concerns have increased dramatically over the last few years, and in many developed countries, the environment could be a key issue in some national elections.[64] Politicians the world over are confronted with the dilemma of how to meet this increased demand. There is an increasing payoff to politicians for promoting strategies that are perceived as innovative in addressing environmental problems. This explains, in part, why President Bush, EPA Administrator Reilly, and Senators Wirth and Heinz have all been willing to promote these ideas in various contexts.

The demand for innovative, cost-effective responses increases as the cost of controlling pollution increases. It also increases as the cost of command-and-control approaches increases *relative* to market-based approaches. There is widespread agreement that, at least in the United States, many of the relatively low-cost fixes for controlling

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[64]Public opinion polls indicate that public concern over environmental quality has remained firm during energy crises, economic downturns, and tax revolts. See: Dunlap, Riley E. "Polls, Pollution, and Politics Revisited: Public Opinion on the Environment in the Reagan Era." *Environment* 29(1987): 7-37; Ladd, E. C. "Clearing the Air: Public Opinion and Public Policy on the Environment." *Public Opinion*, February/March 1982, pp. 16-20; and Lamm, Richard D. and Thomas A. Barron. "The Environmental Agenda for the Next Administration." *Environment* 30(1988):17-29.

pollution have already been implemented.[65] Thus, markets present an attractive alternative for enterprising politicians who wish to identify alternative paths that could lead to greater environmental quality at lower cost.

It should also be recognized that President Bush's familiarity with and attraction to the fundamental, intellectual logic behind incentive-based approaches dates back to his chairmanship of the Task Force on Regulatory Relief during the early days of the Reagan administration. In a variety of regulatory spheres and applications, such as the phasedown of leaded gasoline, the President seems to recognize the importance of giving industry flexibility in the means of meeting goals of social policy.

6.2 Support from Key Special Interests Groups

While the broad increase in the demand for environmental quality bodes well for the increased utilization of economic instruments, the attitudes of key special interest groups[66] are likely to be critical, since it is these groups that have an important say in the actual shape of policy.

Outside interest groups fall into two broad categories -- industry and environmental.[67] Incentives exist for both groups to steer clear of endorsing specific

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[65]Furthermore, in an era of chronic budgetary deficits, it is less and less likely that environmental protection can be increased simply by spending more money on programs and policies already in place. Federal expenditures for all environmental and natural resource programs in 1985 were about $13.4 billion (1.4% of all Federal outlays). See: U.S. Office of Management and Budget. *Budget of the U.S. Government, Historical Tables, Fiscal Year 1987*. Washington, D.C.: U.S. Government Printing Office, 1986; and U.S. Council of Economic Advisors. *Economic Report of the President*. Washington, D.C.: U.S. Government Printing Office, 1986.

[66]We use this term neutrally, not disparagingly. "Special interest groups" play important (and often useful) roles in a representative democracy.

[67]Both are special interest groups, although industry trade associations are typically classified as "private interest groups" while environmental organizations are usually described as "public interest groups." This nomenclature is reasonable in the sense that industry associations represent (special) interests associated with "private goods,"

incentive-based approaches. On the one hand, industry representatives generally want *low levels* of control (relatively weak environmental standards) and are hence afraid of endorsing any policy mechanism (including cost-minimizing ones) for fear that by acknowledging the existence of an environmental problem they will open the way to stricter standards, if not corporate liability. On the other hand, environmental advocacy groups care mainly about achieving *high levels* of control and so are disinclined to "waste time" considering cost-minimizing strategies for achieving given goals and standards. At best, the result is a form of benign neglect from both groups; at times, it has been less than benign.

For environmentalists to support these approaches, they need assurances that the environmental quality achieved using a market approach will be at least as good as, and usually better than, what they see as the likely alternative. Similarly, for individual industries to support such approaches, they need to be convinced that profits will generally be higher than under comparable alternatives. This does not mean that unanimous support is required from all industries or environmental groups to implement market-based approaches, but it is certainly true that significant coalitions of industry or environmental groups can block legislative action or regulatory initiatives.

Although private industry typically is reluctant to endorse any environmental policy mechanism because of fear of implicitly endorsing the related environmental goal, it is also true that once it becomes clear that a policy of some kind will indeed be forthcoming to deal with a given problem, incentives exist for industry to actively favor that policy approach which will represent the least burden to it. In this regard, recall that private industry will, in most cases, tend to favor tradeable permit systems over pollution taxes, since the latter

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whereas environmental groups represent (special) interests concerned with the provision of "public goods."

involve a "double penalty" -- the cost of compliance plus the tax (transfer to government). Likewise, environmental organizations typically have supported command-and-control approaches, but given the choice between marketable permits and emission taxes, they may also be expected to prefer permit schemes, although for a different reason: not only will an "equivalent" emission tax have a greater impact on industry costs and hence on consumer prices, the tax approach also makes this *cost of environmental quality* more explicit, more *visible to consumers* than the permit approach. The result may be less political support for the environmental goal in question, something which environmentalists would obviously prefer to avoid.[68] Also, environmentalists favor tradeable-permit approaches over taxes because the former specify the *level* of environmental protection which will be achieved.

Market-oriented approaches, like their command-and-control counterparts, require commitments by government to monitoring and enforcement. Hence, one means of gaining environmental support is to require increased outlays for monitoring and enforcement activities. Indeed, the requirement of continuous emission monitors appears to have been a *quid pro quo* for obtaining tacit environmental support for the Administration's tradeable permit proposal for acid rain.[69]

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[68]For precisely this reason (i.e. the impacts of emission taxes are more visible to consumers than are the impacts of equivalent tradeable permits), private industry may strategically choose to endorse a pollution tax approach, in the hope that consequent public opposition will result in a *less stringent goal* being established. This appears to be what happened in the closing days of the 1990 Clean Air debate in the U.S. Senate. When it became clear to electrical utilities that a 10-million ton SO_2 tradeable permit program was going to be passed, they proposed an SO_2 tax as an alternative policy mechanism. See: Gaskins, Darius, and Bruce Stram. "A Meta Plan: A Policy Response to Global Warming." Paper presented at John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts, May 8, 1990.

[69]Environmental groups have applied a different and more rigorous standard in measuring market-based systems against command-and-control counterparts. See, for example, the sources cited in footnote 17, above.

6.3 Support from the Bureaucracy

In addition to support from outside interest groups, support from parts of the bureaucracy charged with implementing programs is critical for at least two reasons: first, members of this part of the bureaucracy are well-connected with their legislative counterparts; and second, this part of the bureaucracy will not implement a program effectively if it is not fully committed to doing so.

The bureaucracy supporting environmental interests generally has concerns similar to those of the environmental community; in addition, members of the bureaucracy may be concerned that a proposal will diminish their influence or their prospects for employment. Because markets require that the bureaucracy engage in new and different functions, one might expect some resistance if a large-scale move towards market-based approaches were proposed in isolation. Indeed, this helps explain why such large-scale proposals have *not* been presented in isolation. For example, the Administration's proposals for acid rain were included as part of a much larger package which would enable the bureaucracy to expand many of its traditional functions.[70]

One factor which helps to explain the more favorable reception which some incentive-based policy recommendations have recently begun to receive from within the bureaucracy is simply increased general awareness of the reasoning behind such policy proposals. One cause of this increased awareness may be the growth over the past decade of the "law and economics" movement within major law schools and the proliferation of professional schools of public policy, a consequence of which has been increased

[70]Reference is to those aspects of the Administration's clean air proposals which deal with air toxics, ozone non-attainment, and general permitting, all of which call for dramatic increases in Federal regulatory authority and responsibility.

understanding of economic perspectives of social policy among the younger staff within the regulatory agencies (and committee and personal staff within the Congress). Although such "increased understanding" has not meant that staff have necessarily been more favorably disposed to incentive-based approaches, it seems to have led to greater openness to debate.

6.4 Public Perceptions and Interest Group Attitudes

Interest-group and public support for market-based approaches will be affected by the level of understanding of how these instruments work in theory as well as perceptions about how they have performed in practice. As noted earlier, understanding may have increased somewhat on the part of interest groups; however, it is doubtful that the general public finds it worthwhile to be engaged in these "details." Most voters choose to remain "ignorant" on such issues,[71] simply lack the expertise to engage in substantive consideration of them, or make decisions based on broad ideological bases. Selected interest groups, on the other hand, have a vested interest in assessing how market-based instruments have performed in the past. Some environmental groups have gone to great lengths to try to discredit the performance of environmental markets; indeed, in the past, they sued to stop

[71]According to what has come to be called the "rational voter model" (Downs 1957), citizens in a representative democracy may choose to be well informed on some issues, less than "perfectly informed" on other issues, and quite *uninformed* on others, because information-gathering is costly. Among the factors which may make a difference are individuals' perceptions of the likelihood of their votes affecting the outcome and their perceptions of the importance of the given issue (Mueller 1982). It is clear, however, that much more than opportunity costs (of voting or information-gathering) or the likelihood of affecting outcomes matters (Riker and Ordeshook 1968). Indeed, one particularly comprehensive study concluded that "the theory of voting that is best supported by our results is that which posits a sense of duty or obligation as the primary motivation" (Ashenfelter and Kelley 1975, p. 724). See: Downs, Anthony. *An Economic Theory of Democracy*. New York: Harper and Row, 1957; Riker, William H. and Peter C. Ordeshook. "A Theory of the Calculus of Voting." *American Political Science Review* 62(1968):25-42; Ashenfelter, Orley and Stanley Kelley, Jr. "Determinants of Participation in Presidential Elections." *Journal of Law and Economics* 18(1975):695-733; and Mueller, Dennis C. *Public Choice*. Cambridge, England: Cambridge University Press, 1982.

the evolution of markets in what were frequently viewed as "licenses to pollute." Perceptions are changing, however, in part due to new political and economic realities.

The factors affecting the introduction of economic instruments also affect their likely shape and performance. For example, there is a tendency to grandfather permits in marketable permit schemes and to recycle revenues to selected polluters in effluent fee approaches. Both of these approaches implicitly acknowledge the political importance of the existing distribution of wealth. Moreover, existing approaches generally build on databases and regulations that are already in place. They thus tend to depart quite dramatically from the economist's textbook definition of efficient markets to control pollution.

Some environmental problems are more likely than others to be addressed through the use of economic instruments. In general, emerging environmental issues are more likely to be so addressed than problems that are already regulated. This is because the constituencies that are being regulated are often comfortable with the *status quo*, and thus more likely to resist change and more able to do so. For example, we would expect that, all other things being equal, markets for reducing acid rain and chlorofluorocarbons would be more amenable to regulation through the use of economic incentives than would the achievement of ambient standards for conventional pollutants.[72] The basic point is that once command-and-control is in place, it is difficult to replace because it has a great deal of political appeal.

[72]Also, as indicated previously, the uniformly-mixed, common-property nature of the acid-rain and stratospheric-ozone-depletion problems means that they are more amenable to effective control with incentive-based means than are highly localized problems with threshold health effects, such as some hazardous air and water pollution problems.

The world of public policy formulation is, of course, inherently dynamic. The factors which influence the kinds of policies which will be seriously considered are themselves likely to change over time. For example, perceptions of past performance of economic-incentive mechanisms are likely to change as more research is conducted and as new mechanisms are implemented. If these perceptions change in a positive direction, market approaches are more likely to be utilized.

6.5 The Problem of Constituency

There are strong forces -- some identified above -- which will likely continue to work against the adoption of cost-effective environmental policies. The political system gives much greater weight to distributional concerns than to issues of relative efficiency. For example, it is quite possible that Congress will choose to eviscerate the incentive-based approaches recently put before it. The Senate acid-rain bill does have a tradeable-permit system within it, but pressures exist in the House of Representatives to allow less fuel-switching (from high-sulfur to low-sulfur coal) and thus require more costly scrubbing, in an effort to benefit areas dependent upon mining of high-sulfur coal. Because such a provision would actually increase costs of compliance for midwestern, high-sulfur coal-burning utilities,[73] it would encourage political maneuvers to mandate nation-wide cost-sharing to reduce costs in the midwest, thereby driving a wedge into the heart of the polluter-pays

[73]Forcing scrubbing would indeed protect high-sulfur coal mining jobs (while sacrificing a smaller number of jobs in the less labor-intensive low-sulfur coal mining industry). According to the Congressional Budget Office, there would be a net loss of 7,000 mining jobs nationwide under a cost-effective approach (in which fuel-switching is allowed), relative to a forced-scrubbing approach. With an annual aggregate cost *difference* of about $1.7 billion, forced scrubbing saves mining jobs at an annual cost of about $250,000 each. It is safe to assume that with a flexible approach to acid-rain control, an equitable program of retraining and direct welfare payments could be established at a fraction of this cost.

principle. Such changes would greatly reduce the cost-effectiveness of the system, and move it much closer to a conventional, command-and-control approach.

In this way, individual constituencies, fighting for their own version of "equity" (what is good for them), could win out over efficiency or cost-effectiveness. In the interest of nicely shaped pieces of the proverbial pie, on which all can agree, we may have a systematically smaller pie. A major reason for this, if it happens, would be what Charles Schultze described when he warned that there is no constituency for efficiency.[74]

Can "policy entrepreneurs" or (academic) economists serve as effective lobbyists for efficiency? Although economists and others have played important roles in helping market approaches become reality in selected applications, it seems clear that the primary function these individuals serve is to design and explain systems that may then be considered within the broader political process. In short, it helps, and is probably necessary, to have some lobbyists for efficiency, but it is hardly a sufficient condition for success. The number of such lobbyists on any issue is likely to be very small because the direct payoffs to such activities are very limited indeed.

7. CONCLUSIONS

This paper has presented the normative case for considering various types of economic-incentive approaches for controlling environmental problems. Also, we identified important changes in the Washington political landscape that are likely to lead to greater

[74]Schultze, Charles L. *The Politics and Economics of Public Spending*. Washington, D.C.: The Brookings Institution, 1968. Also see: Haveman, Robert H. "Policy Analysis and the Congress: An Economist's View." *Policy Analysis* 2(1976):235-250; and Olson, Mancur. *The Logic of Collective Action*. Cambridge: Harvard University Press, 1965.

experimentation with such approaches. Finally, a framework was developed for identifying the conditions under which incentive-based approaches are likely to be implemented.

As economists concerned about environmental policy, we are quite naturally bullish on the use of economic-incentive approaches, and we do not mind being labeled "lobbyists for efficiency." At the same time, we are sensitive to the fact that there are very good reasons the rest of the world has been slow to embrace the use of economic-incentive approaches to environmental protection. Some of these reasons include the way economists have tried to package and sell their ideas (for example, not divorcing means from ends) and a general lack of understanding of how these instruments work in practice. But *most* resistance can be explained by the nature of the political process and the relative payoffs to elected representatives and special interest lobbyists of using command-and-control methods as opposed to market-based policies. Thus, while we are personally bullish (for both selfish and altruistic reasons), we believe that the use of economic-incentive policies (which actually work) will increase on the margin, but will likely remain limited in scope. Incentive-based approaches simply do not provide politicians with the opportunity to affect systems in ways that give selected interest groups the protection they desire.

Despite the fact that such practical political considerations will continue to influence the design and implementation of environmental policy, there are reasons to believe that economic-incentive mechanisms will receive a warmer reception in the years to come. For the first time, big-name politicians are leading the charge. Precisely because demand is high and other proposed solutions would result in severe economic dislocation in many cases, proponents of incentive-based environmental policies should be guardedly optimistic.

But for those interested in seeing these ideas become reality, the work has just begun. The next steps will involve the design of market mechanisms that are politically credible. Potential applications of importance include such diverse problems as global climate change, critical habitat loss, and hazardous waste generation and disposal. While improved policy design and understanding will not necessarily lead to widespread application of economic-incentive approaches, without it, they are destined to remain a theoretical curiosity.